INSTRUCTION MANUAL

MODEL A10 HIGH IMPEDANCE AMPLIFIER

10991

ELECTRONIC MEASUREMENTS COMPANY, INCORPORATED

EATONTOWN · NEW JERSEY

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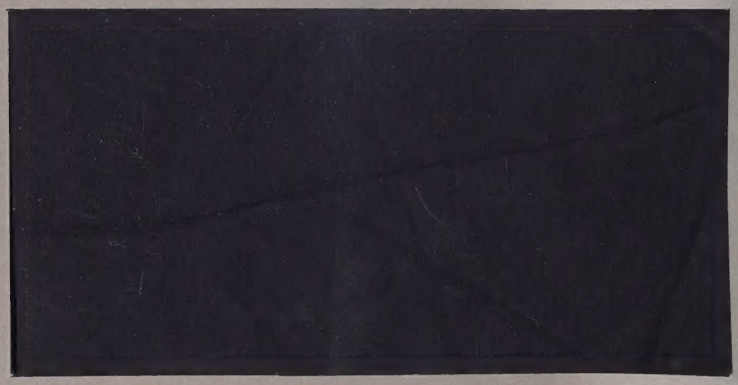

ELECTRONIC MEASUREMENTS COMPANY, INC.
LEWIS STREET AND MAPLE AVENUE
EATONTOWN, NEW JERSEY

MODEL A10 HIGH IMPEDANCE AMPLIFIER

10991

June, 1961

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I GENERAL INFORMATION

The A10 High-Impedance Amplifier is designed for use as a buffer amplifier for programmable power supplies. Use of the amplifier to buffer the remote sense lines of a power supply will allow remote sensing with negligible current drawn by the sense line.

II SPECIFICATIONS (Tentative)

Output Capability: ±40 V at 40 ma
Input Impedance (connected as unity-gain voltage feedback amplifier) - 1000 megohms min.
Power Requirements: 115 V 60 cycles at 2 amperes

III APPLICATIONS

A. REMOTE SENSING. The A10 may be used as shown in figure 1 to buffer either the positive or negative remote sensing lines. so that the programmed voltage appears across the load.

B. REMOTE PROGRAMMING. The A10 can be used as shown in figure 2 to provide high impedance sensing together with remote-programming resistors.

C. CONSTANT-CURRENT CONVERSION. Use of the A10 as shown in figure 3 permits conversion of a voltage regulated power supply to constant-current operation without the necessity of adjusting for sense current. The programmed voltage can be set exactly equal to the product of the sense resistance R_S and the desired load current I_L ($V = I_L R_S$).

D. HIGH-GAIN APPLICATIONS. In addition to applications as a high-impedance buffer amplifier, the A10 can be used as shown in figure 4 as a general-purpose self-contained dc amplifier. In particular, the three circuits shown provide accurate, stabilized gain, with either current or voltage output.

IV OPERATION

To become operative, the A10 amplifier need only be connected to the power line and the line switch thrown on. However, periodic balancing is required to compensate for long-term variations in the tube characteristics, although the amplifier is chopper-stabilized to correct for short term variations.

To balance the amplifier, remove the bottom cover, connect a short circuit between input and output, and short-circuit filter capacitor C10 (20 ufd, 25 V). Apply power and allow five minutes for warm-up. Place a dc voltmeter, at 1 volt full scale, from output to common. Adjust the "zero" control on the front panel until the volt meter reads zero. Remove the short circuit from C10. The volt meter should continue to read within ±10 mv. If not, replace V4 (12AY7) and repeat procedure.

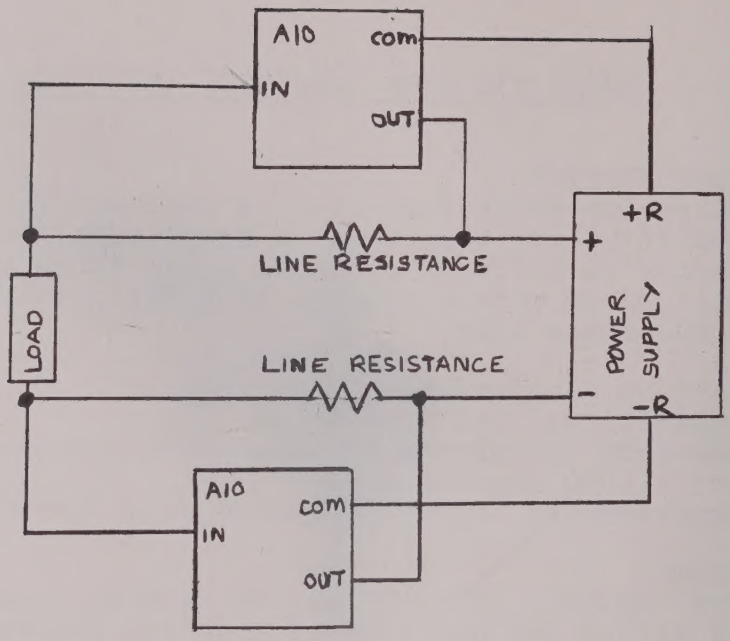


FIGURE 1. HIGH IMPEDANCE REMOTE SENSING

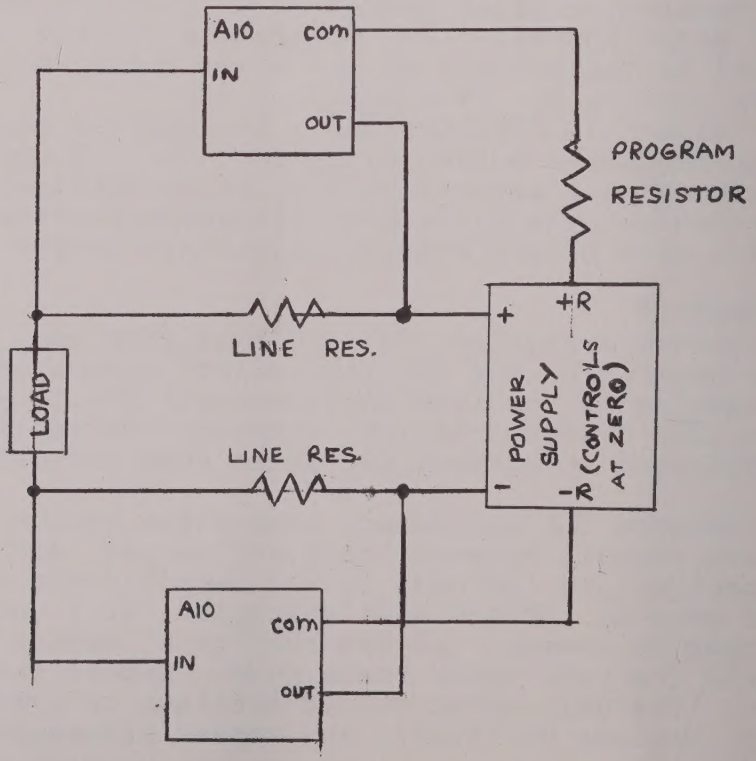


FIGURE 2. HIGH IMPEDANCE REMOTE PROGRAMMING

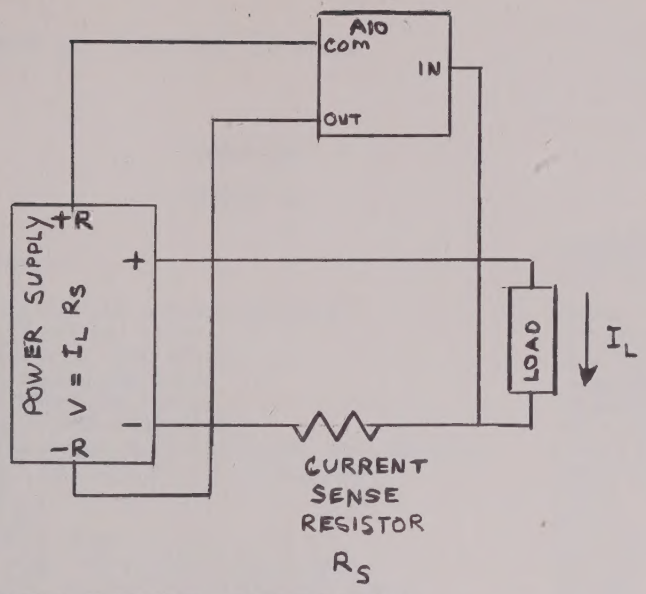


FIGURE 3: CONSTANT CURRENT CONVERSION

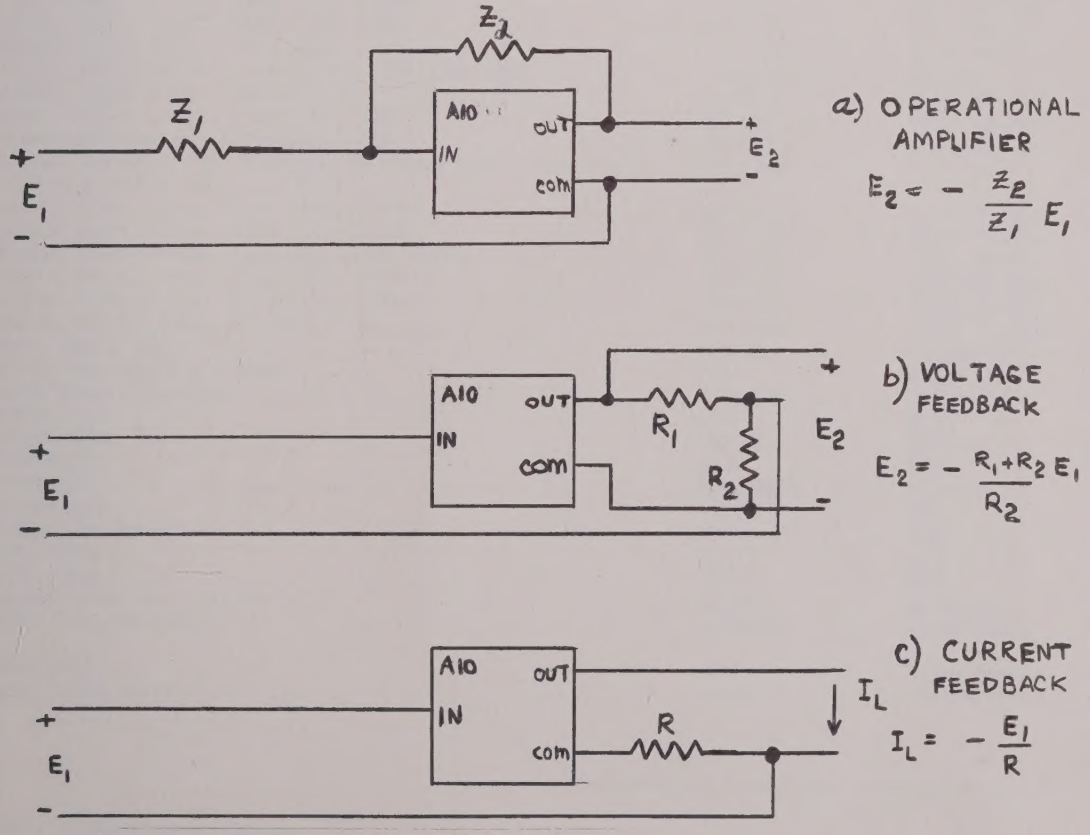


FIGURE 4: HIGH-GAIN APPLICATIONS

ELECTRONIC MEASUREMENTS COMPANY INC., EATONTOWN, NEW JERSEY

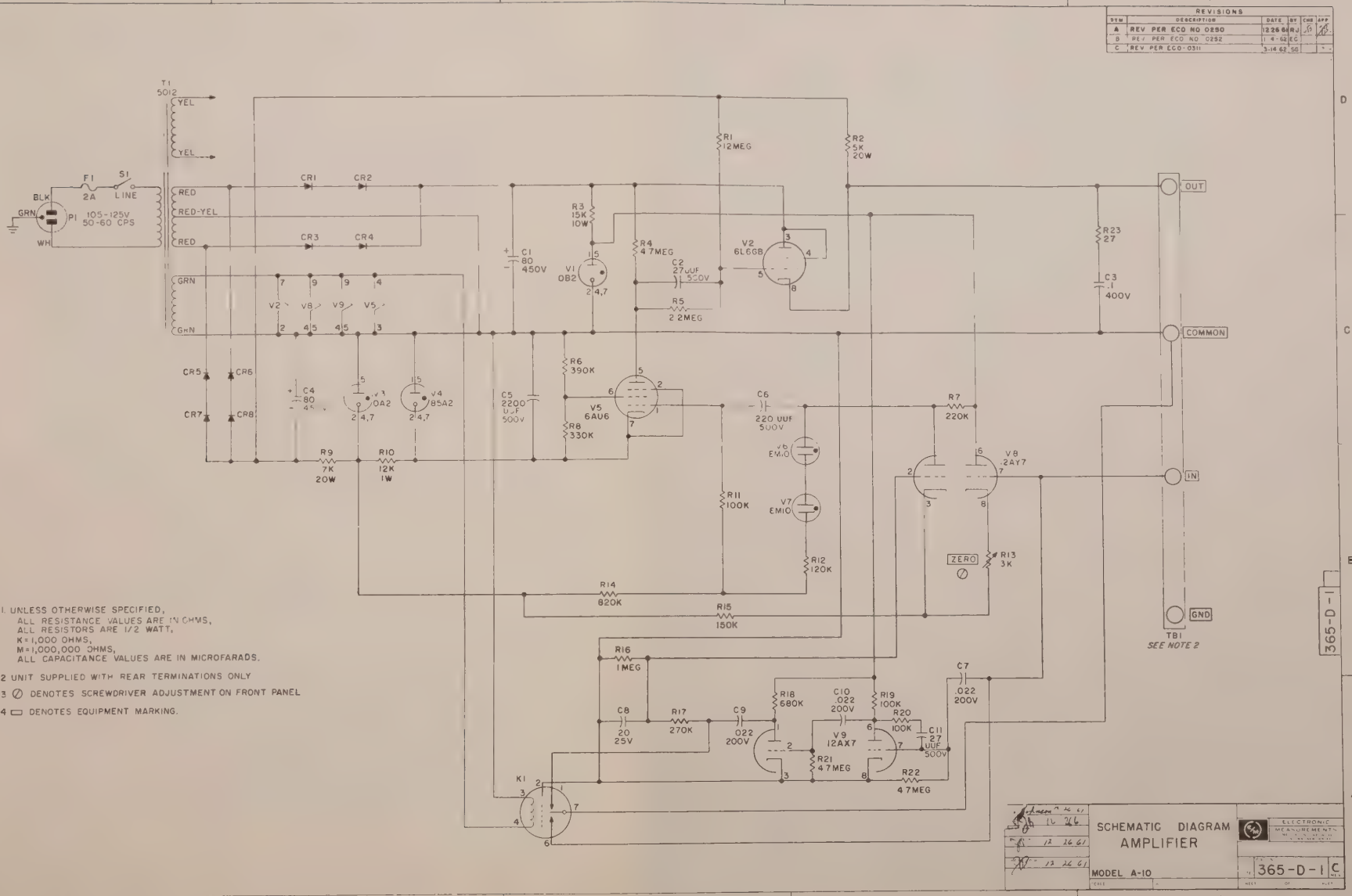
PARTS LIST

MODEL A10 6/62

REFERENCE SYMBOL	DESCRIPTION	TYPE OR PART NO.	MANUFACTURER
*C1, 4	Capacitor, electrolytic, 80uf, 450vdc, insl. sleeve	D15911	Sprague
C2, 11	Capacitor, mica, 27uuf ±5%, 500vdc	CM19B270J	Arco
C3	Capacitor, molded, 0.1uf ±20%, 400vdc	Type IMP-0.1/400	Pyramid
C5	Capacitor, mica, 2200uuf ±5%, 500vdc	CM30B222J	Micamold
C6	Capacitor, mica, 220uuf ±5%, 500vdc	CM20B221J	Micamold
C7, 9, 10	Capacitor, mylar, 0.022uf ±10%, 200vdc	107-0.022/200	Pyramid
*C8	Capacitor, tantalum, etched foil, non-polarized, 20uf ±20%, 25vdc	TAE20-25SDLK-NP	**I. E. I.
CORD	Line cord, 7 ft lg., #18 gauge, 3 cond., 3 prong plug	346-B-52	EMC
*CR1-CR8	Rectifier, silicon	CER71	Solitron
*F1	Fuse, cartridge, 2A	3AG2	Sightmaster
K1	Chopper, SPDT, 6.3v, 60cps	Model 175	Airpax
R1	Resistor, fixed, comp., 12 megohms ±10%, 1/2W	EB-1251	Allen-Bradley
R2	Resistor, fixed, WW, vitreous enamel, 5000 ±5%, 20W	20F5000	Ward Leonard
R3	Resistor, fixed, WW, ceramic, 15K ±5%, 10W	"Koolohm" 10KT15K	Sprague
R4, 21, 22	Resistor, fixed, comp., 4.7 megohms ±10%, 1/2W	EB-4751	Allen-Bradley
R5	Resistor, fixed, comp., 2.2 megohms ±10%, 1/2W	EB-2251	Allen-Bradley
R6	Resistor, fixed, comp., 390K ±10%, 1/2W	EB-3941	Allen-Bradley
R7	Resistor, fixed, comp., 220K ±10%, 1/2W	EB-2241	Allen-Bradley
R8	Resistor, fixed, comp., 330K ±10%, 1/2W	EB-3341	Allen-Bradley
R9	Resistor, fixed, WW, vitreous enamel, 700 ±5%, 20W	Type 'Brown Devil'	Ohmite
R10	Resistor, fixed, comp., 12K ±5%, 1W	GB-1235	Allen-Bradley
R11, 19, 20	Resistor, fixed, comp., 100K ±10%, 1/2W	EB-1041	Allen-Bradley
R12	Resistor, fixed comp., 120K ±10%, 1/2W	EB-1241	Allen-Bradley
*R13	Resistor, variable, WW, 3000 ±5%, 2W, linear taper, 1/4 in. dia. by 1/8 in. lg slotted shaft, series 43	CM18923	Clarostat
R14	Resistor, fixed, comp., 820K ±10%, 1/2W	EB-8241	Allen-Bradley
R15	Resistor, fixed, comp., 150K ±10%, 1/2W	EB-1541	Allen-Bradley
R16	Resistor, fixed, comp., 1 megohm ±10%, 1/2W	EB-1051	Allen-Bradley
R17	Resistor, fixed, comp., 270K ±10%, 1/2W	EB-2741	Allen-Bradley
R18	Resistor, fixed, comp., 680K ±10%, 1/2W	EB-6841	Allen-Bradley
R23	Resistor, fixed, comp., 27 ±10%, 1/2W	EB-2701	Allen-Bradley
*S1	Switch, toggle, SPST	160-73	Carling Electric
T1	Transformer, filament & power	5012	EMC
TB1	Barrier strip, 4 terminal	4-141-Y	Cinch-Jones
*V1	Electron tube	OB2	RCA
*V2	Electron tube	6L6GB	Sylvania
*V3	Electron tube	OA2	RCA
*V4	Electron tube	85A2/OG3	Amperex
*V5	Electron tube	6AU6	RCA
*V6, 7	Electron tube (neon)	EM10	EMC
*V8	Electron tube	12AY7	G. E.
*V9	Electron tube	12AX7	RCA
XF1	Extractor post, fuse, miniature	342003	Littelfuse
XV1, 3, 4, 5, XK1	Socket, 7 pin, miniature	53P24022	Cinch-Jones
XV2	Socket, octal	9977	Cinch-Jones
XV8, 9	Socket, 9 pin, noval	14502	Cinch-Jones

**International Electronics Industries, Inc.

1. *ASTERISKED PARTS are recommended spares.
2. WHEN MAKING REPLACEMENTS: Part numbers are indicative of stock employed at the time of compilation of this list. Unless otherwise noted, and except for Electronic Measurements (E/M) numbers, "or equal" parts may be used for replacement. Electronic Measurements reserves the right to replace a part with an "or equal" part.
3. WHEN ORDERING PARTS FROM E/M: Include model and serial numbers of the instrument. Note carefully and include the letter suffix of any transformer number. In case of a discrepancy between a parts list number and the number actually printed on the part, employ the latter.
4. RECOMMENDED SPARES. When electrolytic capacitors are to be stored as spares for a year or more, request Technical Note 32.


REVISIONS
SYM | DESCRIPTION | DATE | BY | CHK | APP
A | REV PER ECO NO 0250 | 12 26 61 | RJ
B | REV PER ECO NO 0252 | 1 4-62 | EC
C | REV PER ECO-0311 | 3-14 62 | SG
T1 5012
YEL
YEL
F1 2A
S1 LINE
BLK
GRN
P1 105-125V 50-60 CPS
WH
RED
RED-YEL
RED
GRN
GRN
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
V2
V8
V9
V5
C1 80 450V
C2 27 UUF 500V
C3 .1 400V
C4 80
C5 2200 UUF 500V
C6 220 UUF 500V
C7 .022 200V
C8 20 25V
C9 .022 200V
C10 .022 200V
C11 27 UUF 500V
R1 12MEG
R2 5K 20W
R3 15K 10W
R4 4.7MEG
R5 2.2MEG
R6 390K
R7 220K
R8 330K
R9 7K 20W
R10 12K 1W
R11 100K
R12 120K
R13 3K
R14 820K
R15 150K
R16 1MEG
R17 270K
R18 680K
R19 100K
R20 100K
R21 4.7MEG
R22 4.7MEG
R23 27
V1 0B2
V2 6L6GB
V3 0A2
V4 85A2
V5 6AU6
V6 EM80
V7 EM80
V8 12AY7
V9 12AX7
K1
ZERO
OUT
COMMON
IN
GND
TB1
SEE NOTE 2
NOTE
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE VALUES ARE IN OHMS, ALL RESISTORS ARE 1/2 WATT, K=1,000 OHMS, M=1,000,000 OHMS, ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2 UNIT SUPPLIED WITH REAR TERMINATIONS ONLY
3 ∅ DENOTES SCREWDRIVER ADJUSTMENT ON FRONT PANEL
4 ▭ DENOTES EQUIPMENT MARKING.
SCHEMATIC DIAGRAM
AMPLIFIER
MODEL A-10
ELECTRONIC MEASUREMENTS
365-D-1 C
365-D-1

Warranty

Electronic Measurements instruments are guaranteed to be free from defects in material and workmanship for one year from the date of purchase (except for tubes, fuses and batteries). Our liability under this warranty is limited to repairs and adjustments or replacements of defective parts or instruments when the fault is a direct result of defective materials or workmanship in the manufacture of the apparatus. This warranty covers service for the first year, except for transportation to and from the factory. If any fault develops in the equipment, the following steps should be taken:

1. Notify ELECTRONIC MEASUREMENTS CO., INC. Give full particulars of the difficulty and include the serial number of the instrument in question. On receipt of this information, we will give you service information or shipping instructions.

2. On receipt of shipping instructions, forward the appartus to us, prepaid, and we will make repairs and adjustments immediately at the factory.

3. If the fault has been caused by misuse, or abnormal conditions of operation, as disclosed by our examination, repairs will be billed at cost. In this case, an estimate of the cost will be submitted before work is started.

ELECTRICAL STANDARDS

All company primary standards are either certified directly or are traceable to certification by the National Bureau of Standards.

CLAIM FOR DAMAGE IN SHIPMENT

This instrument received comprehensive visual and electrical inspections before shipment. Immediately upon receipt from the carrier, and before operation, this instrument should be inspected visually for damage caused in shipment. If such inspection reveals internal or external damage in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. When referring to this instrument, always include the model and serial numbers.

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